

a first magnetic device carried by the first structural element, the first magnetic device including a first pole piece; and

a second magnetic device carried by the second structural element, the second magnetic device including a second pole piece;

a first coil disposed about at least one of said first pole piece and said second pole piece;

wherein the first biasing element is arranged to provide a biasing force opposing an attractive magnetic force urging the first and second pole pieces together when current is applied to the first coil;

wherein the actuator is arranged so that its first structural element is mechanically coupled to the touch-sensitive panel and its second structural element is mechanically coupled to the display device or its support structure.

9. The touch panel assembly of claim 8, wherein the touch-sensitive panel is substantially transparent and is disposed adjacent to the display device so that a user may observe the display device through the touch-sensitive panel.

10. The touch panel assembly of claim 8, wherein the actuator includes a second coil disposed about at least one of said first pole piece and said second pole piece.

11. The touch panel assembly of claim 8, further comprising a second biasing element, wherein the second biasing element is arranged to provide a biasing force opposing an attractive magnetic force urging the first and second pole pieces together when current is applied to the first coil.

12. The touch panel assembly of claim 8, wherein the first biasing element comprises a spring.

13. The touch panel assembly of claim 8, wherein the first biasing element comprises an elastomeric element.

14. The touch panel assembly of claim 8, wherein the first biasing element comprises a foam material.

15. The touch panel assembly of claim 8, wherein the first and second structural element and the first biasing element are all formed from the same material and the first biasing element is formed thinner than the first and second structural elements so that it is free to flex when perturbed.

16. The touch panel assembly of claim 8, wherein an electric current applied to the first coil causes the actuator to generate haptic effects by creating relative displacement of said touch-sensitive panel and said display device.

17. A method for providing haptic effects in a touch panel assembly, the method comprising:

- measuring a touching contact with a touch-sensitive panel;
- generating a first signal in response to the touching contact;
- transmitting the first signal to a processor;
- creating a haptic output current signal in response to said first signal;
- carrying said haptic output current signal to an actuator arranged to create relative motion between a first structural element and a second structural element thereof, the first structural element mechanically coupled to the touch-sensitive panel and the second structural element mechanically coupled to a display device; and
- causing a haptic effect by actuating the actuator.

18. A method for providing haptic effects in a touch panel assembly, the method comprising:

- measuring a touching contact with a touch-sensitive panel;
- generating a first signal in response to the touching contact;
- transmitting the first signal to a processor;
- creating a haptic output current signal in response to said first signal;
- carrying said haptic output current signal to an actuator arranged to create relative motion between a first structural element and a second structural element thereof, the first structural element mechanically coupled to the touch-sensitive panel and the second structural element mechanically coupled to a display device, wherein the actuator further includes
 - a first biasing element coupling the first structural element to the second structural element;
 - a first magnetic device carried by the first structural element, the first magnetic device including a first pole piece;
 - a second magnetic device carried by the second structural element, the second magnetic device including a second pole piece; and
 - a first coil disposed about at least one of said first pole piece and said second pole piece;
- wherein the first biasing element is arranged to provide a biasing force opposing an attractive magnetic force urging the first and second pole pieces together when current is applied to the first coil; and

causing a haptic effect by actuating the actuator.

19. An apparatus for providing haptic actuation, the apparatus comprising:

- a first means for mounting the apparatus;
- a second means for mounting the apparatus;
- a first biasing means coupling the first means for mounting to the second means for mounting;
- a first magnetic means carried by the first means for mounting, the first magnetic means including a first means for confining magnetic flux and a first means for generating a magnetic field about the first means for confining magnetic flux; and
- a second magnetic means carried by the second means for mounting, the second magnetic means including a second means for confining magnetic flux;

wherein the first biasing means is arranged to provide a biasing force opposing an attractive magnetic force urging the first and second means for confining magnetic flux together when current is applied to the first means for generating a magnetic field.

20. A touch panel apparatus for providing haptic effects, the apparatus comprising:

- means for detecting a touching contact with a touch-sensitive panel;